"The Study of Races and Present-day Anthropology"

by Doctor Gustave Le Bon

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Among the sciences that have drawn the most attention in recent years, one can certainly rank anthropology. Before the revelations we owe to prehistoric archeology and to progress in the natural sciences, the study of man appeared to defy being able to transform itself. By seizing so many marvelous discoveries, a new science undoubtedly opens up for us new horizons. Like Minerva going out wholly armed with the brain of Jupiter, the young goddess—that is, anthropology—will shine with a deep wisdom. To her comes the solution to all those mysterious problems that over the centuries philosophers have in vain exhausted themselves over. The eternal sphinx, having tamed mankind for so long with her magic rod, will at last deliver her secrets.

Of all the many expectations evoked by this science from its dawn, what has occurred? For twenty years anthropology has continued its persevering labor. The hour has arrived to ask of it what it has yielded, above all inquiring into what it intends to yet produce.

We shall begin first of all by attempting to define anthropology. In appearance this seems easy, but, in reality, it is hardly such at all.

If we look to deduce its definition from etymology, we see that anthropology is the science of man; however, this is quite vague. If we wish to take our definition from books, we find indications that are even vaguer. In the first of its articles, the Anthropology Society of Paris restricts itself to saying that anthropology “has for its goal the scientific study of the human races.”

Such concise definitions, however, possess a false clarity. In order to obtain a clear idea of their value, one must inquire into what they in reality hide. As a general proposition, one ought not to demand too much for information relating to the limits of a science; whenever this is done, the natural tendency is to usher in very dissimilar things or things which are connected only in a very remote way. For example, a distinguished anthropologist recently maintained that music and sculpture comprise part of the

anthropological sciences. Undoubtedly, they are connected just as legitimately as linguistics, demography, and medical geography are, fields which some have also wished to unite. But, anatomy, physiology, chemistry, physics, history—in a word, all that concerns man—it is puerile to fancy that a new science can be formed from what one reassembles from others. If anthropology truly includes, as its disciples maintain, "the ensemble of sciences contributing to the complete knowledge of mankind," then the best actual anthropology treatise will be some sort of universal encyclopedia.

Moreover, all these definitions amount to very little; what we must simply be aware of, I repeat, is what they in reality hide. In researching them we shall easily discover what are the usual subjects of the works of present-day anthropologists.

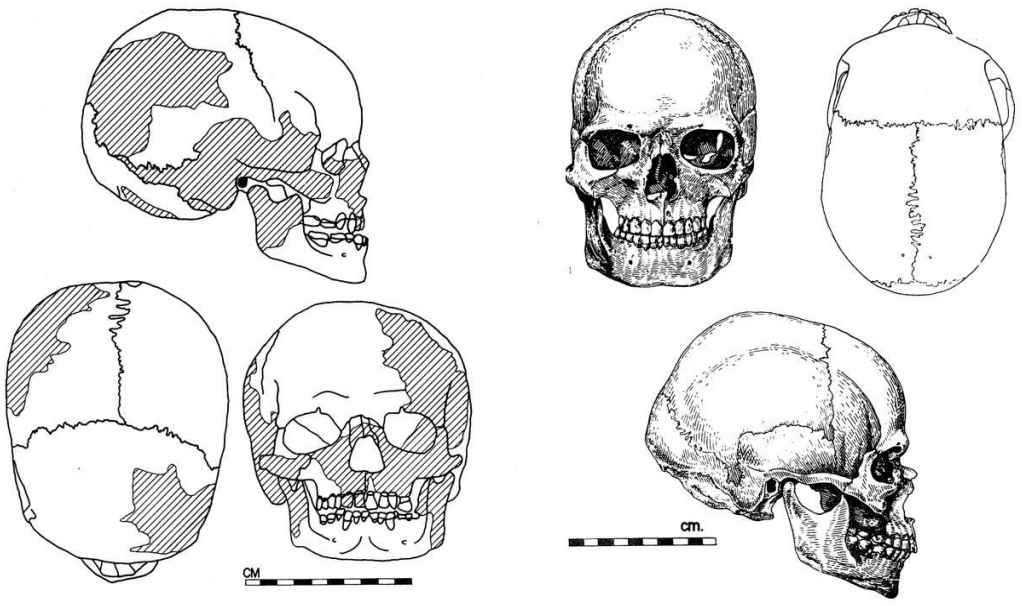
Such research will prove quite easy to perform. It will suffice, in fact, to peruse the *Bulletins* of the Anthropology Society, the *Instructions* that it publishes, and the collections that it assembles.

The most cursory examination of all these documents shows us from the very first one essential fact. Whereas anthropology in prior days—and this science has not been around all that long—only occupied itself with moral man, present-day anthropology occupies itself with anatomical man, devoting itself to the variations of the body in the various human races. In its *General Instructions for conducting anthropological research on the living*, the Anthropology Society of Paris does not recommend anything else but the investigation of these variations. The moral, intellectual and social study of peoples seems so outside of the research plans of today's anthropologists that it did not obtain in the *Instructions'* 300 pages a single line of mention.

The works of present-day anthropologists, moreover, also mirror the direction indicated by the *Instructions*, and the collections assembled by these scientists evidence the same tendency. Measurements of skulls and sometimes of skeletons: this is what their research amounts to; meanwhile, the fundamental part of their museums is restricted to displaying and storing collections of skulls and skeletons.

In addition, these measurements are things so complicated that they can defy the patience of the most learned Chinese men of letters. Just on the skull alone there are a hundred measurements—curves, diameters, angles, indexes, etc.—to take; and there are hardly any less to effectuate upon the living. Indeed, an explorer or scientist travelling abroad who desires to follow conscientiously the instructions of the anthropologists, and bring back in sufficient number measurements of all the individuals visited by him, will not have any chance of furnishing a nearly complete work unless he begins his operations at the youngest age and continues them up to the most extreme old age.

If we consider the direction of contemporary anthropological studies, and set aside the series of sciences that are totally independent (such as statistics, archeology, and medical geography) that some try to embrace but which are just as distinct as a course on Sanskrit can be, we arrive at a definition significantly clearer than those enunciated above: present-day anthropology has for its aim the comparative anatomy of the skeleton and exterior shapes of bodies in the human races.



Because a hundred different complicated measurements of the skull can be taken, an anthropologist wishing to produce a complete work on the skull measures of 10,000 individuals studied by him will need to take 1 million measurements, a years-long endeavor that he may never finish during his lifetime.

However, this definition is much too broad still, and a more minute observation permits us to narrow it further. Explorers and scientists travelling abroad generally have much more important preoccupations than taking on the inhabitants that they visit the innumerable measurements that the *Instructions* recommends be taken, but which nobody has ever demonstrated to be useful. Most of these researchers believe it preferable to devote their time to study the customs and character of the visited individuals, rather than to engage in measuring their cranial diameters or the length of their tibias. As a result, professional anthropologists have barely exercised their restless energy for measurements but on skulls that some have brought back to them. These skulls constitute the heart of their museums, and their measurement comprises the usual object of anthropologists' work and published research. For every 100 skulls that one comes across in the museum of the Anthropology Society of Paris, one hardly finds a single skeleton. Our preceding definition must therefore become the following: *Present-day anthropology is that accessory branch of comparative osteology which occupies itself in studying skull variations in the different human races*.

Modern era anthropology being so clearly defined, we shall now investigate what the works focused on this branch of knowledge, performed by distinguished men, have produced in the last twenty years.

II

The study of skulls of the human races certainly comprises a very small branch of the science of man, but it might be possible that the results obtained will prove sufficient to silence the gloomy minds who assert that the intellectual and moral knowledge of an individual is more important than that of its skeleton, and who also claim that wishing to understand a man or a race by simply studying its bones or skin color will turn out to be as difficult as recognizing a Raphael virgin from the signboard of a wine merchant, by the simple chemical analysis of the colors that compose it.

Unfortunately, a close examination of the facts shows that it is the gloomy minds and not the anthropologists who are right in this

instance. The measurements of thousands of skulls and a small number of skeletons performed in the latter have indeed produced some results, but these results are so deficient that they are really a trifle in comparison to the enormity of the work expended. The most experienced anthropologists are quite obliged today to confess that 90% of the measurements that they take on skulls are acquired with the expectation that they will be able to be utilized later on, though they do so without having the vaguest idea of how these measurements will be able to be used one day. They persist doing all this without hope of ever withdrawing themselves from their obscure and thankless labor. Measurements such as that of the facial angle, which formerly seemed the chief way to distinguish the races, are today recognized as being without value. Divisions based on the ratios of the horizontal diameters of the skull, and which were even considered for a while to form one of the cornerstones of craniology, seem destined to soon experience the same fate. As today's most illustrious French anthropologist, Professor de Quatrefages, has justly remarked: "The same index value is situated near some of the others belonging to the most dissimilar races—for example, the southern German's closely corresponds to the Annamite's, as is the case with the Parisian and Malay, the Belgian and Tagal, etc.—for in the white races their indexes are dispersed in the midst of all those belonging to the colored races."

Professor Jean Louis Armand de Quatrefages

This eminent anthropologist I just cited is well qualified to express his opinion on the value of craniology, for he has devoted many years to writing a considerable work relating to the description of the skull of the diverse human races. The conclusion of a labor which has required for more than 10 years the cooperation of a learned collaborator is expressed by him in his latest work in the following way: “Does the superiority of a race truly indicate itself outwardly by some material signs? We are not yet aware of it; and, whenever one looks closely at the matter, everything tends to make one think that there isn’t any such outward manifestation.”

Certainly, nobody has more closely looked at this matter than the able professor of the Museum. I think, however, that he exaggerates a little, and that his own works do not convey in them such a pessimistic conclusion nor do they appear to stamp as completely unuseful the formidable amount of research already performed. That the results obtained up to now have been quite minimal, we willingly concede; that the direction of anthropological studies must entirely change, we shall be the first to demand. But, though these results are seemingly quite minimal, they nevertheless exist to a significant degree, and we shall soon show that it is only the absence of a sufficient method that has prevented us from seeing their appearance. Whenever we learn to place them in evidence, it will be seen that they cannot be disregarded.

III

In order to appreciate and judge in an equitable way the present state of anthropology, it is necessary to refer to the circumstances which have given birth to it. If we go back twenty years to the time when one of the most famous founders of modern anthropology, Doctor Paul Broca, appeared, we see that the study of man did not have at its disposal any precise method. Tired of the banalities of the philosophers who, since Aristotle, have always gone around in circles, Broca and others felt the necessity of applying to this study precise processes analogous to the ones that other sciences already possessed. Psychology was not then what, thanks to the work of modern-day physiologists, it is today. For a long stretch of centuries it

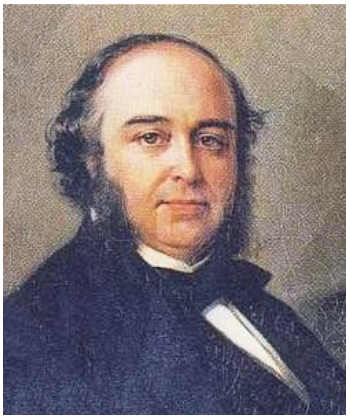
had hardly progressed, and its inability to reveal to us the real nature of man made many suppose that this same inability would always continue; to ask for any breakthroughs from it seemed pointless.

Given that anatomy is that branch of the study of the human races which turns out to be the most susceptible to precise observations, it is through it that one ought to begin. Additionally, as the skull is the only part of the body whose measurements one is able to easily procure, it is this body part that researchers should strongly focus on. The underlying causes of questions completely settled today, such as the superiority of the skull volume of the white over that of the black, or of the male over that of the female, have still not been determined. Doctor Broca, a first-rate anatomist and researcher, thinks that it will be necessary to first collect many more facts, reserving to the distant future the study of the laws that govern them.

It was therefore through studying the skull that Doctor Broca helped found modern anthropology. The authority of his powerful voice launched with this study an entire generation of researchers.[1] While they brought with them the ardor of the master, they were unable to bring his penetrating genius. Where the head of French anthropology would see in the data an average, the disciples would only see numbers. These materials that the eminent scientist was assembling in order to erect the monument that he certainly would have built if death had not struck him down in his maturity appeared to his pupils and disciples to be science itself, and they only perceive anthropology to be the study of the skull. The harm caused by this attitude has been to delay anthropology's progress for 20 years, a standstill from which it has not yet emerged. The uncontested master of anthropology in France, Doctor Broca would have by himself been able to make his disciples deviate from the way that he had at first engaged them, tracing out for them another direction for their work. As often occurs in similar situations, the death of the famous scientist, having his title and standing but no successor, was for French anthropology a loss from which it is feared that it will not recover.

I said that it is feared that anthropology will not recover from Doctor Broca's death, and here are my reasons. Men whose influence is great enough to imprint on the works of their contemporaries a fixed direction are always in number extremely limited, and when they disappear, their influence still persists for a long time. It suffices to examine each science in order to recognize that the general direction of the works of each era are traceable to a small number of masters; Cuvier to his era and Pasteur to our own are striking examples of this phenomenon. Indeed, original minds are everywhere exceedingly rare. To patiently carve the stones destined to erect an edifice that most often will not be noticed, this is the modest role to which the majority of workers are necessarily resigned. Occupied in work that is completely traced out for them, and not engaging themselves in the labor of thinking, a relative success always crowns their efforts. In order to be a workman, patience is generally sufficient. But, in order to be an architect, one must possess talent, and talent is the lot of only a small number of men.

Also, it is always sad to see an enormous sum of work devoted to research that will hardly ever lead to anything. For example, the folios of the scholastics of the Middle Ages, produced by such a large amount of wasted effort, come to mind; additionally, just within the field of anthropology, one can ponder over the gigantic sum of useless research that the impulse provided by Gall engendered. Although only half a century separates us from the works of the phrenologists, the Pharaohs of the pyramids themselves are not plunged in an oblivion more dark.



Doctor Paul Broca

In the presence of such vainly wasted efforts, some reflection is imperative. Clearly, any work that we conduct nowadays that yields valuable results will likely not become obsolete if such work has been expended in a useful direction!

A similar reflection comes to mind when one surveys the works of certain present-day anthropologists. How much time has been uselessly wasted while having been painstakingly employed![2] Suppose that instead of there being instructions restricted to recommending measurements that are impossible for travelers and explorers to take, that is to say, by the only persons who have occasion to take them, that these latter were possessed with properly drawn-up instructions making known the intellectual, moral and social state of the races visited by them. Can one seriously believe that such findings would not contribute more to the "scientific knowledge of the human races" than thousands of cranial measurements? Alas, on these fundamental points we often lack the most essential documents. With the attention of travelers and explorers not having been stirred up over these questions, the information and data that they have furnished us have proven most insufficient, with the result being that studies directed at improving our understanding the evolution of man and societies, studies whose importance we are beginning to recognize, are still in their infancy. During the four years that I devoted to retracing in my work*: l'Histoire et les societies, leurs origins et leur histoire*, the picture of the successive phases of the physical, intellectual, and social evolution of our species across the ages, I was hindered on each page by the absence of documents respecting the inferior races. Data on skin color, the microscopic aspect of their hair, and skull dimensions I always found: but what did all this tell me about the nature of man?

Indeed, so much of genuine anthropology, which studies living people and not cadavers, remains so to speak at ground level. Obscurity still reigns over fundamental questions. For example, after a thorough analysis of documents brought back by all the travelers and explorers, Lubbock and Tylor have in two important works recently reached totally contradictory conclusions on such capital questions as the one concerning whether or not all savages possess religious beliefs. Additionally, before he began writing his *Principles of*

Sociology, Spencer was obliged to expend a lot of time and probably money as well in order to perform a comprehensive inquiry—an inquiry which turned out being terribly incomplete due to the insufficiency of the available documents—on the inferior races.

Whenever we wish to truly understand present-day human races and gain a clear notion of the diverse forms that the family, property, morality, beliefs, institutions, industry, arts, etc. have successively assumed, it will be necessary to study the human races by means of methods that are unrelated to those that we employ today. There is no time to lose in beginning this study because most of the inferior races are in danger of disappearing. The little that we already know about the evolution of man is certainly destined to transform history. If we desire to glance into the future of mankind, or merely understand clearly the necessities which govern his present evolution, we can only arrive at this by the knowledge of his past state. Now, this past state, I repeat, can only be well understood by a thorough understanding of present-day inferior races. Such a study requires nothing from the documents collected by anthropologists up to now; we shall say a few words later on about the way it seems to us that such a study will be able to be undertaken.

Painting of Herbert Spencer, author of *Principles of Sociology*

IV

The general overview that we have proceeded to cast on the works of the anthropologists has solely been focused on the direction of their studies and the nature of the facts that they have collected. It remains for us now to investigate how these facts have been utilized by them. A science is not only composed by facts; it also contains a method. Having seen the facts, let us now examine the method.

Whatever be the nature of the observations that are made on a group of individuals—that is, whatever is a question with respect to height, cranial measurements, age or any other qualities—these magnitudes can only be clearly expressed by numbers. As it will be very complicated to show all the amounts corresponding to each of the individuals making up part of the observed group, scientists usually add up all the units and divide their sum by the number of units. The result thus obtained is represented by a single number which we designate under the name of the arithmetic mean, or ***average***. This average, as we shall see, represents a fictitious value which is formed by increasing some of the individual measured amounts while diminishing some of the others. Values obtained in this way, being expressed by a single number, allow for easy comparison and, indeed, form the fundamental purpose of statistics. In works devoted to this science, statisticians have defined it, in fact, along these lines by stating that it is "the science which composes itself of all the observations that are susceptible to being converted into averages that can be expressed by numbers."

Almost exclusively employed in statistics, the method of the averages is also used in a nearly exclusive way in anthropology. In the second edition of his anthropological *Instructions*, published a short time before his death, Doctor Broca asserted that this method is "the most secure foundation of anthropology."

Up to now, in fact, it has been the only foundation. We shall now show that outside of its apparent simplicity, the only argument invoked in its favor, the method of the averages has been relied upon by my colleagues only because, in reality, other statistical methods

have not heretofore easily lent themselves to the necessities of anthropology.

Now, in order to accurately judge the value of the method of the averages, it will be necessary to give and examine some examples.

Let us suppose that there is a gathering of 100 individuals possessing all the ages comprised year by year between 1 and 100 years, and so by consequence this group includes 1 one-year-old person, 1 two-year-old person, 1 three-year-old person. . . and 1 hundred-year-old person. The only information that statistics will provide us on the composition of this group will be that the average age of the individuals who compose it is 50 years, an age that, in reality, only one of the observed subjects possesses.

Let us now supposed another group composed of 100 individuals, of which about half turn out to be extremely young children, and the other half prove to be persons who are extremely old: 51 children two years of age, and 49 100-year-olds, for example. Certainly, such a group will be very different from the preceding group, because at least a third of the individuals who make up the former group will be in their prime agewise. However, once again statistics will affirm that the average age of the individuals of this second group, composed exclusively of weak children and decrepit oldsters, is also 50 years—that is to say, an age that absolutely none of the observed individuals possess and one which all deviate from considerably.

Without a doubt the two preceding cases are hypothetical examples created by design and which, one can say, will not be met with in real life. We have, in fact, only chosen them for their clarity of demonstration and in order to immediately make one understand the necessity of having a method that indicates the nature of the elements which have served to form the averages. As absurd as our two examples are, the habitual results that the works of statisticians furnish us are entirely just as absurd. For example, statisticians tell us that the average duration of life in France is 40 years. Presented with this information, the reader will immediately be predisposed to believe that this is the age at which the largest number of people succumb; now, it is precisely the opposite that occurs: it is 40-year-

olds who die the least, and mortality deals severely mainly with the elderly and young children. The normal lifespan of adults in France is not 40 years, but about 70 years.

The above observations are applicable to other usual results provided by statistics: the average height, for example, is never the one that is found the most frequently, as one might believe.

When it is a matter of height, mortality, age, cranial dimensions, economic records, etc., information supplied by averages is likewise misleading. If we desire to know, for example, what the consumption of meat and wine is of the inhabitants of a particular country, statistics will provide us with numbers that do not represent the real consumption of any of the inhabitants of this country. They have been obtained, in reality, by uniting individuals who never consume wine or meat with those who on the contrary consume each daily. The economist who wishes to draw from such numbers conclusions on the social state of a country will arrive at results just as erroneous if, upon visiting a village composed, like that sometimes seen in Ireland, of one person who's a millionaire ten times over and 999 mendicants, he asserts that this village enjoys great affluence because the average fortune of each villager is 10,000 francs.

The only actual utility that the method of the averages possesses is that it permits one to condense into a single number values that are close to one another and which therefore are comparable. It is by this reason in daily use in astronomy and renders this science valuable service. For example, let us suppose that one or several observers have taken at various times the latitude of a place and that the observed latitudes only differ by some tenths of a second. Nothing is assuredly more legitimate than to put one's trust into annulling the errors by adopting for the actual latitude the average of the observed latitudes. But, if it turns out that the observed latitudes differ by a certain number of minutes or, worse yet, degrees, it will not come to the mind of any astronomer to give as the actual latitude the average of such observations. Given two astronomers who measure the latitude of the same place, if one finds it to be 40° and the other (admitting such a possible thing) finds it to be 50°, they will immediately recognize that a gross error has been committed and

will immediately recommence their observations. They will never suppose that the latitude of the place is 45°, that is to say, an average value between the two observed measurements. What no astronomer would dream of doing, statisticians and anthropologists do daily when they add together completely dissimilar values in order to create a unique number.

This highly erroneous method of the averages which is tightly embraced, as we have noted above, by statistics and anthropology has, in fact, been exclusively adopted by these sciences. Statisticians and anthropologists readily throng to whatever results this method is able to convey. We'll return to this discussion soon. For now I'll say with respect to the above-made points this: averages, as much in anthropology as in statistics, are fictitious values that in real life are hardly ever met with, and they only succeed, except when observations are taken on things whose numerical values are very close to one another, in providing a totally false idea of the elements that have served to constitute them.

Let us now see if it will be possible to replace averages with numbers that indicate the real nature of the elements from which they are derived. Such a thing is, in fact, easily accomplished, and the first merchant of gloves or hats we chance upon will clearly show us the process to follow. Whenever one of these dealers finds it necessary to restock his inventory, he does not determine what the average size is of the hats or gloves that he has sold, because the average will represent a fictitious size that is not suitable to anyone. Instead, he simply examines his books and sees how many customers out of 100 there were who bought from him hats or gloves of each possible size. He then writes to his manufacturer: For every 100 pairs of gloves or hats that you send me, make so many of such and such a size, so many of another size, and so on. If the businessman that I have supposed is, let's say, a used clothes dealer, his method of operating will be identical. He will not ask the statisticians to tell him what the average height is of the inhabitants of the country he does business in, but rather he will merely research how many individuals out of 100 there are of each height.

The preceding grouping approach that I have described succinctly

I have named the ***placing in series method***. Without a doubt as old as mankind, it has the need for a father. Quételet in France, Morselli in Italy, and some statisticians have on rare occasions applied it to anthropology and statistics; but, for the very simple reason that I have already noted its employment has remained up to now extremely restricted.

Using the two methods that we have examined—the one involving averages and the other involving a series—let us see, for example, how the height of the population in France is expressed. The method of the averages comes up with a number, undoubtedly absurd, but at the same time unique and easy to seize by intellects who can only grasp extremely simple things. On the other hand organizing the data in a series will produce 50 numbers, making known how many out of 100,000 individuals there are of all the heights comprised, centimeter by centimeter, between 140 and 190 centimeters.

In order to more easily convey the comparison of values that have been organized in a series, I have attempted to express them by curves; however, the curves thus obtained are of a nature such that their comparison is nearly impossible. They form, in fact, a series of capital A's stretched out at the lower edges, entangled to such a degree as soon as one superimposes many of these curves that it will prove impossible to perceive the relations existing between the compared dimensions.

Belgian statistician Adolphe Quételet (1796-1874),
one of the first scientists to use the placing in series method

One now easily understands why the method of the averages continues to be universally employed. What it has given to anthropology is perfectly indicated by the previously-cited passage of Professor de Quatrefages who, after years of conducting extensive craniological studies, was obliged to acknowledge that he had not been able to discover any distinctive mark of superiority between the diverse human races. Now, when one restricts himself to the indications supplied by averages, as indeed nearly all anthropologists up to now have done, this conclusion of Professor de Quatrefages is very legitimate. The average man of one race differs in reality very little from an average man of another race. Setting aside totally special qualities (which are very few in number) such as the color of the skin, one can say, if one refers to averages, that the most dissimilar races differ much less between themselves than do the individuals of any race.

When I get around to writing up the second volume of my previously-cited book, *l'Homme et les societies*, I intend to examine some questions that are of great interest to me, and whose solution, easy to have a presentiment of from the psychological point of view, ought to find serious support in currently-compiled anatomical records. I shall not enter upon an investigation of certain social problems without: 1) first understanding the nature of the differences which exist between different races or between individuals of the same race; and 2) without knowing if these differences tend to efface themselves or, on the contrary, increase with the progress of civilization, and by consequence if mankind is marching towards equality or, contrarily, towards a more and more accentuated inequality, etc. With the works of anthropologists being totally mute on these questions, I am obliged to search for the answers myself.

An attentive investigation soon proved to me that there isn't anything truly useful to draw from the averages that encumber the books of anthropologists. However, it turns out that it is in the original materials themselves, that is to say, by examining the individual measurements, that one can search with success for the solution of the problems that interest me.

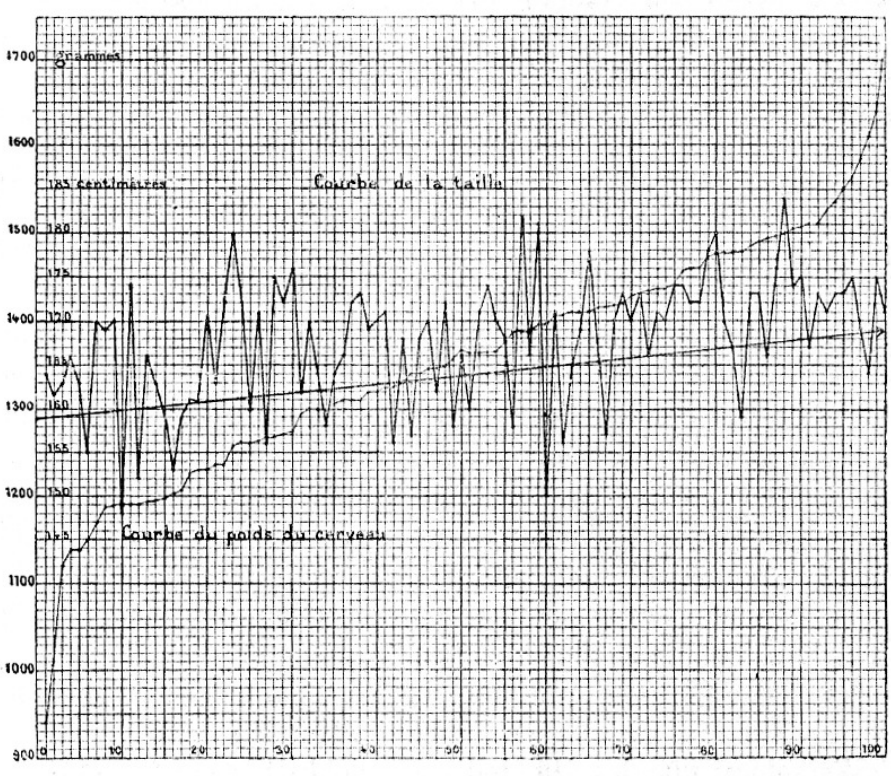
As the richest collection of known records belonged to Doctor Broca, I addressed myself to this illustrious anthropologist in order to have access to them. They were immediately, and with the most gracious generosity, placed at my disposal.

The aspect of these records was not encouraging. In fact, they presented themselves under the form of voluminous registers containing hundreds of thousands of numbers. Very different from each other when one considers them individually, these numbers hardly differ at all when on the other hand one reduces them to an average. I was convinced that their study would make conspicuous essential laws; but, for a long time I wondered in vain how to discover such laws.

At first I employed the placing in series method. This provided me some results, but these results were still inadequate. I at last attained success by inventing a system of curves that I have named ***centesimal curves*** or ***curves of series***, which clearly express the percent of objects classified according to a certain variable, and indicate immediately, not only the averages, but above all the elements which have served to form these averages. In fact, whatever quality appears only once in the observed group will find itself indicated. Moreover, and this is a fundamental point, these curves immediately display the mathematical relations existing between various observed dimensions (Graph 1). Any one of these curves can also be represented analytically by a very simple equation. It is thus, for example, that having determined the equation of the curve which reveals the percentage of individuals of each age in France for all ages comprised between 1 and 100 years, I found concealed in an equation having only a few letters the hundred numbers or thereabouts representing these ages. In fact, the simple solution of the equation of the curve provides results nearly identical to those furnished by statistical tables.

Centesimal curves therefore possess a precision quite dissimilar from the one obtained by Quételet, when he believed he had proven that the height or weight of a country's different inhabitants, etc., are grouped, not at random, but rather very much according to the law of Newton's binomial coefficients. In fact, the curves that can be

constructed with these binomial coefficients will only provide rough indications of the reality under investigation. Furthermore, they are applicable only when the variations on the plus or minus side of a phenomenon are distributed symmetrically around a certain dimension.



Graph 1. Minimal influence of height on brain weight; limited nature of this influence in the grouping by series.

The first scale on the left side represents brain weight in grams, from 900 to 1750 grams. 1 millimeter = 10 grams. The second scale on the same side represents height in centimeters, from 145 to 185 centimeters. 1 millimeter = 1 centimeter.

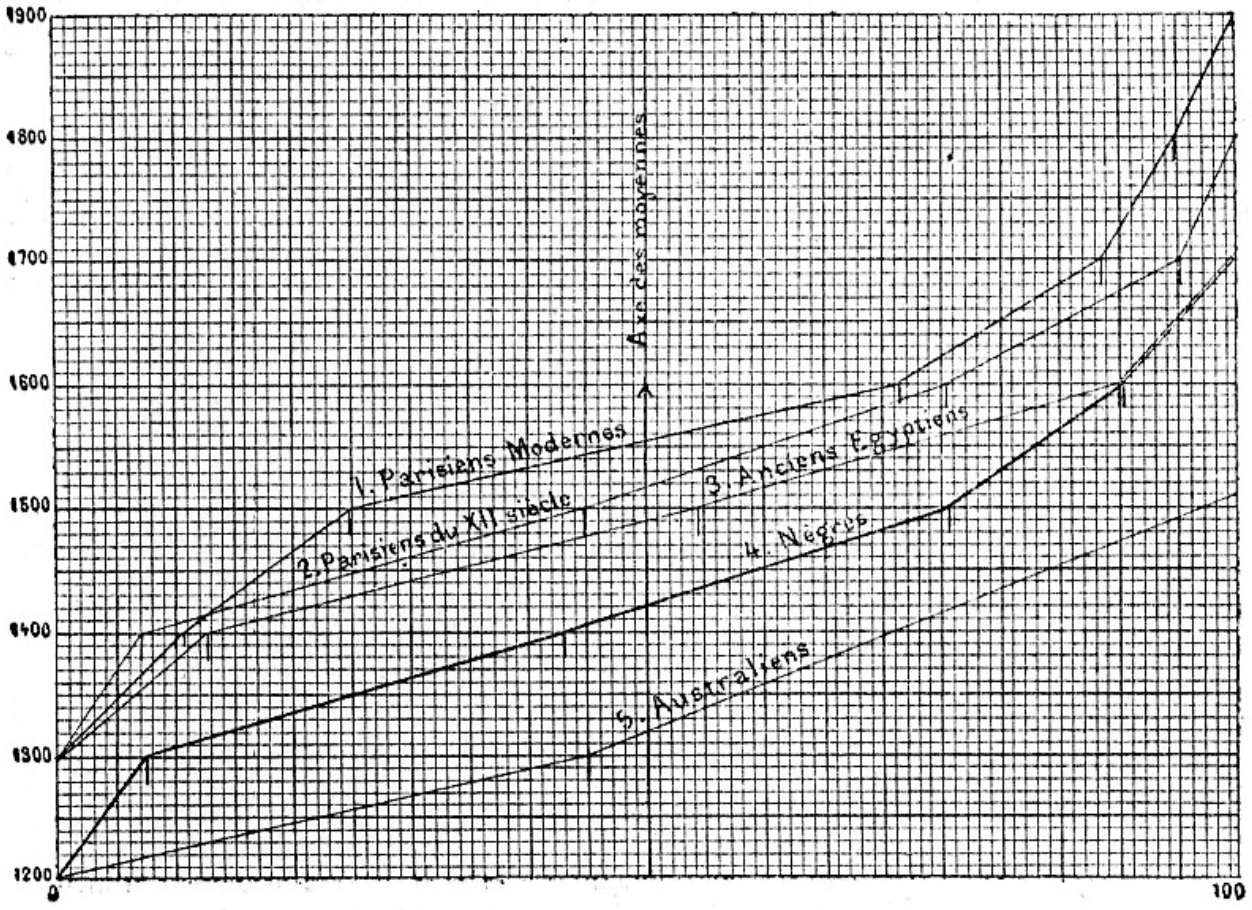
The curve which regularly rises from 940 to 1725 grams is the curve of the weight of the brains arranged in an increasing way. The very irregular curve (appearing like a series of capital A's) that cuts through a large number of points is the curve of the heights that the individual possessors of these brains have. Each vertical line contains, as one can see, two points, one indicating the weight of the brain, the other the corresponding height. It is the union of all these points by lines which constitutes the two curves.

As the appearance of these two curves does not seem to reveal any relation between brain weight and height, it is only in the grouping by series that one is able to discern the latter's influence. The horizontal line obliquely crossing the graph from 1289 to 1387 grams shows the limited nature of this influence (in fact, very small).

Having now possession of a precise method of investigation (i.e., utilizing centesimal curves), I applied it to the documents that I had before my eyes, and immediately relations that I thought ought to exist, but which I had previously been unable to discover and which had moreover also escaped the exertions of anthropologists, became evident. For example, mathematical relations that exist among the diameter, circumference, volume, and weight of the brain and skull became apparent. The influence on cranial capacity, of one's sex, height, body weight[3], civilization, intellectual aptitudes, etc. also became easy to determine. Most notably, I saw that skull volume directly corresponds with intelligence when, setting aside individual cases and above all averages, one operates on a series; that what distinguishes the inferior races from the superior races are not the slight variations in the average capacity of their skulls, but rather this essential fact: the superior race contains a certain number of quite voluminous skulls, whereas the inferior race does not. With respect to this latter fact, I shall remark that from the psychological point of view it is perfectly understandable. It is not by the masses, but rather by the number of those who distinguish themselves which differentiates races. From one people to another the difference between the masses is not considerable. **What mainly differentiates races, quite as well from the point of view of civilization as from the anatomical point of view, is, I repeat, that some possess a certain number of individuals having very developed brains, whereas the others possess very few such individuals, or even do not possess any.**[4]

The important fact which I have highlighted above will not be placed in evidence by a comparison of averages because what primarily affects these values are the numbers which reveal themselves frequently. Two races might possess, as much from the anatomical point of view as from the intellectual point of view, an identical average cerebral capacity and yet be very unequal. What is important to understand is the compositional mode of the groups that have served to constitute the averages. A race that is only composed of individuals whose brain is 1500 cubic centimeters will certainly be inferior to a race that has 90 out of 100 individuals possessing only a 1400 cubic centimeter cranial capacity but which also has 10 out of 100 individuals who possess a 1700 cubic

centimeter cranial capacity. However, with the method of averages one will be strongly led to believe that it is the former race on the contrary that is superior to the second.



Graph 2. Curves showing the progressive development of skull volume in the human races and clearly indicating that there are a great number of men who by skull volume are nearer to the apes than to other men.

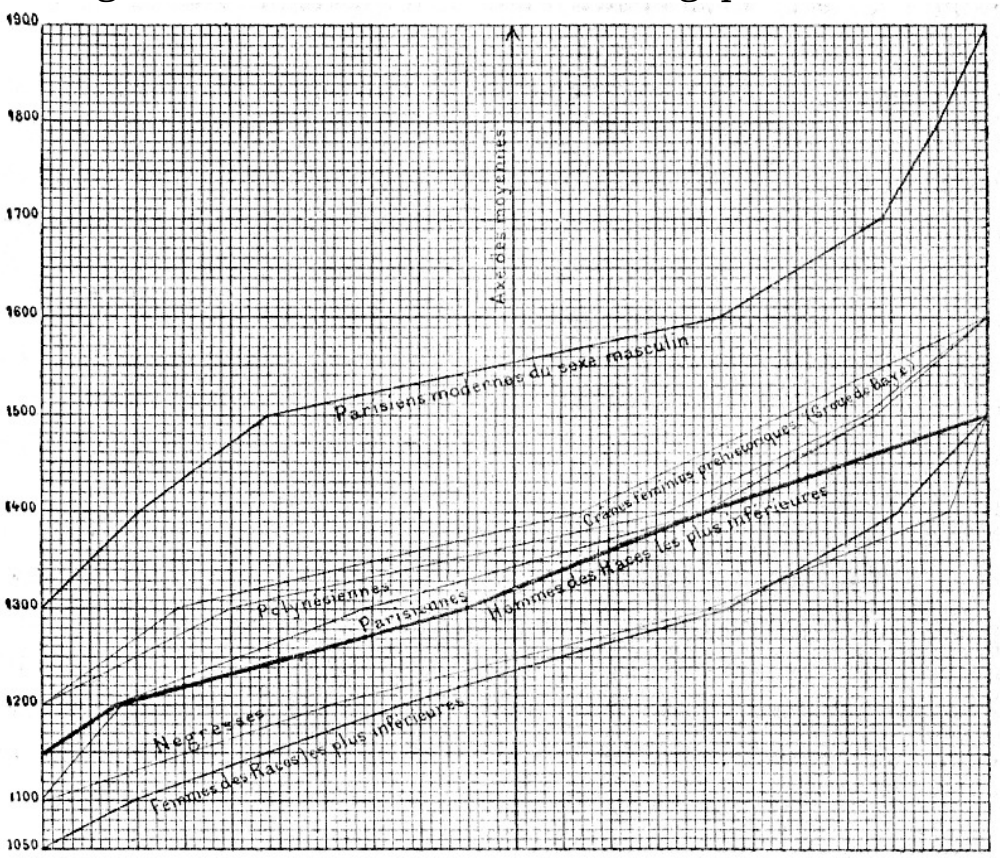
The left side scale is the scale of skull volume from 1200 to 1900 cubic centimeters. 1 millimeter = 10 cubic centimeters; 1 centimeter = 100 cubic centimeters.

One need only count how many millimeters are horizontally contained between the points where the curve intersects the horizontal lines corresponding to the level of the left margin numbers in order to learn how many out of 100 subjects there are having a given cranial capacity. For example, let's say one wishes to know for every 100 present-day Parisians how many possess skulls measuring from 1800 to 1900 cubic centimeters. One sees immediately that between the points where the curve cuts the two horizontals corresponding to the numbers 1800 and 1900 the distance measures 5.2 millimeters. This amount represents the sought after number.

Comparing next both present-day and past skulls of diverse races (Graph 2), I first of all saw that differences in skull volume are considerably greater between men than what the averages indicate, because skull sizes might vary as much as twofold and, in reality, one sees that a large number of individuals occupy by the volume of their skull an intermediate position between the great anthropoid apes and subjects whose brain is the most developed. Now, this interesting result immediately knocks down one of the most important anatomical barriers that heretofore we believed existed between apes and men, and which, in fact, stands out when comparisons are only borne and expressed by averages. I next observed that the races whose skull volume presents the greatest individual variations are the races most elevated in civilization; additionally, as a race becomes civilized, the skulls of the individuals who compose it differentiate themselves more and more; what follows from this result, easy moreover to have a presentiment of from the psychological point of view, is that it is not towards intellectual equality that civilization leads us, but rather towards a more and more profound inequality. Anatomical and physiological equality only exists between individuals of completely inferior races. Among members of a savage tribe, all devoted to the same occupation, the difference is extremely small. Between the peasant, who only possesses 300 words in his vocabulary, and the scholar, who has 100,000 words along with corresponding ideas, the difference on the contrary is gigantic.

Applying the same method to the differences existing between the sexes, I soon discovered that at the same age, height, and weight, the female possesses a considerably smaller brain than the male (Graph 3); that this difference turns out to increase from one century to another in a large percentage of the population and, consequently, the civilized female tends to differentiate herself more and more from the male. Whereas among savages or among our half-civilized ancestors of ancient times, the skulls of men and women only differed a little, among civilized people today the difference has become immense. Whereas our modern-day Parisians of the masculine sex take their place at the head of the observed races with respect to cranial capacity, Parisian women find themselves placed at an appreciably lower level to that of women of certain peoples of

Polynesia where, because of the difficulties of existence, the intellectual aptitudes are constantly exercised. Viewing the curves which display to the eye this influence of civilization on the difference that exists between women and men, one feels himself to be in the presence of a veritable abyss; indeed, I believe that given the slow hereditary accumulations which have repeated themselves over the centuries, it will be necessary for similar repeated accumulations to occur for generations in order for this gap to be filled.



Graph 3. Skull volume of women of diverse races compared to the skull volume of the highest and lowest races.

The scale ranges from 1050 to 1900 cubic centimeters. These curves show: 1) the relations existing between the skull volume of men and that of women; 2) that although the difference in skull volume between men of the superior and inferior races is very large, the difference between women of diverse races is quite small; 3) that the female skull of civilized people is much nearer in size to that of men of the inferior races* than to that of men of the superior races; 4) that women of the superior races do not at all occupy the rank occupied by males of the same races.

* The curve of the skull of the inferior races has been constructed by combining the male skulls of all the lowest races—Australian aborigines, Bushmen, Hottentots, etc.—that the Museum of Anthropology in Paris contains.

I shall not proceed any further with my analysis of the results provided me by the application to anthropology of the centesimal curves method. If I have recalled some of these results, it most certainly is not because they are personal to me (others, utilizing the centesimal curve method, could easily make such discoveries), but rather simply to demonstrate the importance of such a method to anthropology. It is an instrument that permits anyone to detect results which, without it, invariably escape the most expert observers. By way of analogy, with a thermometer a child can appraise much more exactly the temperature of a body than a well-trained physician who only has his hand as a guide. The only difference is having the thermometer.

I have only applied to anthropology this method; it is clearly applicable to other sciences as well. Indeed, it is very necessary for one to turn to centesimal curves when one desires to understand the composition of a group, and see the relations that it might present with other groups which, as I have pointed out, are not at all apparent when one restricts oneself to comparing averages.[5]

V

We have come to see what anthropology is nowadays; it remains for us to investigate what it might be. From all that we have said, the following conclusion becomes quite clear—a conclusion, as we know, which is shared by many distinguished anthropologists. If present-day anthropology persists in the way that it has been going, that is to say, continues to focus on comparative craniological studies, it will soon lose all credit; the position that it might assume, others will seize, and the Byzantine discussions which it now endlessly engages in will not even remain a memory. We nevertheless hope that by yielding to other inspirations, it will change direction and come to understand the importance of the role that it may be called upon to fill.

No matter what the era, there is, in fact, no field more vast than the study of mankind for those who desire to apply the various methods of investigation that modern science has placed at our

disposal. Indeed, there is perhaps no field whose importance is greater. The science of the evolution of societies has up to now hardly formed any part of the works of anthropologists; however, these are the works that may be able to provide anthropology its most firm foundation. From understanding, not just the anatomical, but above all the intellectual and moral qualities of races, springs political and social consequences of immense importance. The uncertainties that still reign on very great subjects of interest, such as, for example, the possibility of civilizing inferior races and the means to employ for this to occur, clearly show us the absolute necessity of pursuing this field of study.

In my recent work on the development of societies, a work I've already alluded to above, I show several times what sort of lights need to be projected on the history of peoples in order to reveal knowledge of their intellectual and moral state. It certainly is not by the measurement of bones that one will be able to predict what impact a political constitution like the one the United States has will produce among populations composed of mélanges of Indians, whites, negroes, and mixed race individuals, such as the ones who inhabit Mexico or the Spanish American republics. In fact, an observer well versed in the most advanced studies will not be at a loss to foresee the unfortunate outcome of such attempts, nor will it be difficult for him to ascertain what will be produced by the current attempts to bring about civilization in Japan, where now one sees the application of institutions that govern us on races that find themselves in a phase of evolution as different from our own as from that of the Annamites. Researching what might result from contact or from intermixing different races, I have been able to easily show under what circumstances these intermixings will be useful or detrimental; why, when two races whose sentiments differ too much are in each other's presence, one of them is fatally condemned to disappear or to be brought under servitude; that if they do intermix, the anarchy that will necessarily result may only be curbed and put down by the harshest governance (whatever be the name such governance assumes). Examining the case of the English in India, the Europeans in China, and the redskins in America, I have demonstrated that by numbers the gigantic massacres by the ancient conquerors which history talks about are a trifle compared to the destruction of people produced

indirectly among the inferior races by their contact with present-day civilization, and this is simply because the ancient conquerors differed much less from the conquered peoples than do today's civilized men. It has been easy for me to prove that the evolution of a society will be determined, not by the political institutions that one imposes on it or that it imposes on itself, but rather by the composition of the anthropological elements of which it is formed; that from this composition springs for certain peoples the possibility of free institutions or, conversely, the necessity to submit to the harshest laws; that the commonality of language, which seems so important and upon which people have wished to base the existence of nationalities, possesses, on the contrary, a very weak importance; that what is much more important than a common language is the commonality of certain sentiments that a long past can alone create because of hereditary accumulations, keeping in mind, though, that certain beliefs might be destroyed in the individual himself or among the nation's diverse individuals by antagonisms which none of the institutions know how to remedy.

George Washington presides over the signing of the US Constitution.
The evolution of society will not be determined by its political institutions, but rather by the composition of the anthropological elements of which it is formed.

These very profound differences which separate men were completely unknown a hundred years ago. All human beings were reputedly cast from the same mold; and whether it was a question of a negro, Chinaman, Roman, or a nobleman of the Royal court, people made them out as if they felt, thought, reasoned and expressed themselves in the same manner. Today we are barely beginning to surmise the differences, however important, that separate various races or individuals of the same race as well as the not less great differences which separate us from our ancestors. The most important branch of anthropology—the comparative psychology of peoples—has hardly begun to constitute itself. Our clearly figuring out what an individual endowed with a mental constitution other than our own thinks about a given subject is, moreover, very difficult. We have proof of this by the fact that most persons living constantly with women, children or lower race individuals only possess a very faulty notion of the real state of these latter's intellect. The strange idea of providing all children an identical education, or of their beginning to learn a language by means of the study of grammar, this even more strange thing of wishing to govern an inferior people with institutions applicable to Europeans, and a thousand other analogous facts that I could cite, clearly show how the differences which exist among men are profoundly unrecognized.

It will be the duty of anthropologists to study and clearly define these differences. Any such understanding will provide the most certain base that one might be able to give to two categories of essential knowledge: education and politics, that is to say, the difficult art of elevating men and the even more difficult one of governing them.

Envisaged from this point of view, anthropology might appear to be difficult; but, utilizing an appropriate method of investigation will suffice for it to be entered upon profitably. It will first be necessary to clearly indicate how one ought to research the existence of intellectual or moral sentiments, their ability to be associated, and finally to perceive their close or remote analogies and their differences. For example, a totally inferior intelligence will hardly be able to associate two ideas at a time and will only see their

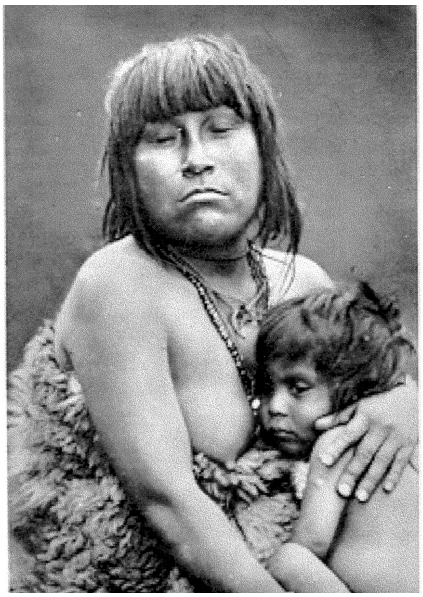
analogies and apparent differences. By an intellectual mechanism identical to the one where the Eskimo believes that glass, which resembles ice, ought like ice to melt in the mouth, such low intelligences will classify together animals as distantly related as the whale and fish. The scientist, who sees under the apparent analogies the real analogies, will know, on the contrary, to separate them, and will not be at a loss to show that a whale is much more closely related to a mouse or horse than it is to a fish. Weakly possessed in the female, savage, and child, the ability to associate ideas and perceive how they resemble or differ from each other varies as much among individuals and races as the extent of sentiments. Whereas some people only have for a guide the impulse of the moment, complicated associations of ideas are what directs the actions of others.

The thorough study of the variations of sentiments and of intelligence, of the way in which they associate themselves, may by itself provide us the key concerning the possible evolution of individuals and races, and the way which we can have an effect on them.

In order for such a study to be easily rendered, and in order that the results obtained are able to be successfully compared, I came to the conclusion that it will be necessary to have very precise instructions drawn up, and, above all, instructions drawn up under the form of a questionnaire. This naturally led me to investigate what the anthropological instructions should be, instructions destined to supersede all the explorers who exist today.

Beginning with that which concerns anatomical observations, it seems clear to me that about 90% of the measurements recommended nowadays can be quite advantageously omitted. They do not have any other result, in fact, but to divert anthropologists away from making observations which they might then unite with useful documents which, not knowing what to select from this immense medley, they prefer not to touch. Simply put, very plain indications respecting the color of the skin, eyes hair, height, skull circumference, the shape of the nose, face, etc. will prove entirely

sufficient. In addition, a great part of these indications can also be replaced by photographs that are: 1) executed according to certain set rules, and 2) provided with scales. I am able to state, from my own personal experience during a trip that covered 5,000 miles, that with the dry emulsion processes which have so singularly transformed present-day photography, nothing is easier than the practice of this art while travelling and that there truly are no measurements which require less time. For example, quite recently I was able to accomplish photographing a group of natives of Tierra del Fuego, the resulting pictures of which I've presented to the Anthropology Society of Paris, without even having to occupy myself with obtaining these persons' permission or having them remaining still while I took their picture. Thanks to the rapidity of the above-mentioned processes, I have, in fact, been able to operate in an absolutely instantaneous manner. Taking the photograph of an individual, in spite of his highly varied movements, having now become an easy thing, one may seize without difficulty the most mobile physiognomical expressions. As for the carry case necessary to obtain photographs possessing the size of a half-page of this journal, it corresponds pretty near to the volume of a large dictionary, and one will find that the smallest suitcase will be able to hold complete provisions sufficient for the longest trip.



Photograph taken in an instantaneous manner
of a Fuegian mother and child

Resuming that which concerns anatomical observations, I believe that a table taking up half a page, accompanied by at most 10 pages of instructions, will be largely sufficient.

With respect to the intellectual, moral and social state of peoples, which present-day instructions do not even mention, a questionnaire, running no more than a dozen pages in length, will suffice to make known to researchers what areas and points they ought to focus their research on. I must add that a thoroughly-composed questionnaire will provide a much clearer idea of an observed people than several large volumes of dissertations. A committee of the Ethnology Society of Florence, headed by Doctor Letourneau, drew up a few years ago a short questionnaire of this sort which, although incomplete or silent on certain points and too detailed on others, will serve as a good model to consult.

With tables and detailed explanations, the above will make up a small volume of about 30 pages. If it had existed 20 years ago, anthropology would by now have possessed a mass of material incontestably more valuable than the thousands of cranial measurements that grow moldy in the Societies' storage boxes.

Although mainly intended for researchers who travel abroad, it is nevertheless not only for them that these instructions might prove of service. They will prove very useful to those certainly numerous travelers who are interested in pursuing anthropological research and who will be pleasantly surprised to see a totally new field of observations that are easy to carry out everywhere and which can be done without the employment of complicated instruments. Plenty of observers, who today justly recoil from the irksome work of taking innumerable measurements, the utility of which no one has yet discovered, will enter upon with great pleasure comparative anthropology research, the nature of which will be clearly delineated on the individuals who surround them.

Now, it is not uniquely on distant populations that such observations might be applied, for countries whose anthropological study is the most often passed over are those that we ourselves inhabit. Speaking only of France, it is very necessary that the

anthropology of the diverse races which compose it is well understood. This mixture of quite different races—Celts, Germans, Normans, Burgundians, Basques, Aquitanians, etc.—is open to important studies. Indeed, whereas in the large cities this intermixing is more or less complete, in the villages, those notably in the countryside and mountains, it is still far from being effectuated, and the study of these different races may provide extremely useful documents for the intellectual and moral understanding of our population. Such observations will certainly provide as much interest as those that are carried out on Eskimos and Samoyeds. They will at the same time have the advantage of being within the reach of any intelligent and conscientious sedentary observer whose residence is itself in the most modest village. I believe, in short, with respect to the above, that there is no research more useful and more deserving of occupying the spare time of an educated man, and there is none which requires less material and preparatory instructions.

Some readers might perhaps remark that, before one offers suggestions and advice, it would be wise for one himself to provide examples. I totally share this opinion, and if I permitted myself to provide the preceding suggestions, it is because I have first tried to judge their usefulness through experience. In order to demonstrate that anthropology, as I see it, need not entail serious practical difficulties, and that by employing correct methods it can lead an ordinary observer to important results, I shall soon make known the anthropological results that I obtained during a short sojourn I had with the inhabitants of the central massif of the Carpathians. I shall indicate how, thanks to the methods employed, it has been possible for me to bring to light the present-day formation of a race located at the foot of the Tatras Mountains. My paper containing the account of my Tatras mountainfolk research will appear in an upcoming issue of the *Bulletins de la Société de géographie* of Paris. With its summary serving to set forth how it seems to me that anthropology can be usefully practiced by one when travelling abroad, I shall make it the subject of a second article.

FOOTNOTES

1. Except for the volume of *Instructions* on the living, which I have talked about above, the *Instructions* of the Anthropology Society, published by Broca, only includes the complete study of the skull.

2. One need only glance through certain papers, where the lack of analysis and personal initiative badly conceal themselves under scientific appearances, in order to see to what extent young men full of good will, but deprived of direction, can waste their time in futile research. I am able to cite, as a curious example, a work in which the author, after having patiently weighed hundreds of arms, legs and heads in order to discover the relations existing between their weights, arrived at obvious conclusions such as this one: "The weight of the skeleton varies proportionally to the weight of the femur." Without going to so much trouble, the author will be able to say that a skeleton's weight varies proportionally with the weight of any limb. It is quite evident, in fact, that the most voluminous limbs will belong to the most developed individuals, but it is no less evident that Monsieur de La Palisse will ever be assuredly able to express a similar verity without having recourse to an anthropology laboratory.

3. With respect to the relations existing between body height and the weight of the brain, as well as that which concerns the influence of one's sex on the weight of the brain, the most learned anatomists have been led, due to a lack of method, to making highly contradictory assertions. It is thus that we find Cruveilher, in the latest edition of his large *Traité d'anatomie*, saying "that it results from a great number of facts that the volume and size of the brain are independent of the weight of individuals." Milne-Edwards, in his *Leçons de physiologie* (t. XI, 1876, p. 252), writes that "considered in an absolute way, the encephalon of the male is much larger than that of the female; but, proportionally to the mass of the body, the difference is in the opposite direction." With regard to this latter author, I must hasten to add that in the fourteenth volume of his magnificent recently-published work, the eminent professor has rectified this opinion by depending above all on my research results that he chose to use many times.

Other anatomists have maintained completely opposite opinions. From a strict observation of the facts standpoint, both sides have reason: the error only rests in the way of interpreting the established facts. In a civilized race the variations in the weight of the brain are considerable; one even encounters female brains that are more voluminous than those of certain males. The results obtained therefore spring from the nature of the skulls which each anatomist has fallen upon. It is only by operating on a certain number of skulls, comparing the averages and researching most of all how the numbers which serve to constitute these averages are distributed, that one will be able to arrive, as I have done, at perfectly clear results.

With regard to the relation existing between skull volume and the level of intelligence among the human races, it is rather generally admitted, although sometimes disputed (for reasons analogous to the ones mentioned above). One particular case has confirmed in a striking way what I have advanced on this subject. After the publication of my researches, having knowledge of the existence at the Natural History Museum of Paris of a collection of 42 skulls of famous men (Boileau, Marshal Jourdan, Wurmser, Gall, Descartes, etc.), I obtained authorization to measure them. Their cranial capacity entirely surpassed anything I would have supposed. Only judging by the volume, one would have truly believed that their possessors formed a race of giants. The average capacity of 26 skulls of the most well-known subjects, in fact, amounted to 1732 cubic centimeters. With the average capacity being 1559 cubic centimeters for Parisians, whereas that of negroes is 1430, one sees that famous men distinguish themselves more from ordinary men by their skull capacity than the latter differ from negroes. But, these capacities, when grouped in series and expressed in curves, reveal differences considerably more striking than those provided by the comparison of averages. About a quarter of the Parisians possessed skulls with a capacity less than 1500 cubic centimeters. Of the 26 famous men I mentioned earlier, one only finds a single skull, that of Roquelaure de Bessuejols, Bishop of Senlis, chief almoner of Louis XV, and little regarded moreover for his intelligence, which had a smaller capacity. Only 12% of present-day Parisians possess a cranial capacity greater than 1700 cubic centimeters; by contrast, 73% of the famous men surpass this amount.

One ought not to conclude, of course, from the preceding that the development of the skull must be the only factor that corresponds with the development of intelligence; one encounters great intellects in small heads and low intelligences in capacious heads—but these are the exceptions. Moreover, the brain does not uniquely serve the intellectual functions; it also is the seat of sentiments and emotions; additionally, it is not uncommon to find races or individuals (criminals most notably) whose cranial capacity is much more the result of the development of certain sentiments than that of intelligence.

4. In a recent work published in the *Dictionnaire encyclopédique des sciences medicales*, one of the most scholarly French statisticians, Doctor Jacques Bertillon, has claimed the priority in this law—a law that he supposedly expressed in a paper on the New Caledonians; however, it seems evident to me that in formulating his claim our colleague was not attentive to the spirit of what he wrote in the work to which he alluded. In fact, one merely finds there this: “Yet we differ from New Caledonians (from New Caledonians only) much more by the relative number of large brains than by the number of small ones.” It was only after the publication of my work that Doctor Bertillon came to regard as a general law what he had formerly considered as only applicable to New Caledonians. Moreover, he attached so little importance to this result that he did not even state it in his conclusions. Besides, it will be apparent to a sufficiently judicious observer that the fact verified by him may be completely accidental. For example, when comparing 20 New Caledonian skulls to 5 or 6

times that amount of Parisian skulls, it will altogether be natural to not find amongst the latter but a very small number of large skulls, notably those that one finds only 2 or 3 times out of 100. When comparing 20 Parisian skulls randomly chosen with 100 other Parisians skulls, also randomly selected, one will arrive at identical conclusions. In his work Doctor Bertillon has made use of series; but, lacking a sufficient method he has arrived at results that he alone today is defending. Indeed, one sees in the overly excessive work in which he has provided more than 14,000 measurements, taken on a very small number of skulls, that Doctor Bertillon drew the conclusion that "it is only by the occiput that we prevail over the Melanesians." This, in fact, is exactly the opposite of the truth. The placing in series method will not any more permit him to discover the causes of the irregularity of a series of Parisian skulls measured by Doctor Broca, causes that he declares completely escapes him. Our system of curves will immediately show him that the irregularity originates simply from this fact: that the skulls are comprised of a mixture of male and female skulls—and that it will prove sufficient to separate them in order to see at once the signalized irregularity disappear. I have not make these last remarks in order to criticize the value of a work produced by an observer as sagacious and conscientious as Doctor Bertillon; with the method in use at the time he was unable to do any better; rather, I have simply wished to show how insufficient the methods generally used by anthropologists up to now have been.

5. The reader will find a sufficient exposition of the above in my work entitled: *Recherches anatomiques et mathématiques sur les lois des variations* du *volume du crâne* (1879, treatise crowned by the French Academy of Sciences and the Anthropology Society of Paris). Although the theory of averages, so cherished by Doctor Broca, is something I energetically combatted in my treatise, the *Revue d'anthropologie* which belonged to Broca published my work nonetheless. Far from trying to stifle ideas contrary to his own and blocking my paper from the only journal where it could be published, the eminent anthropologist himself offered me the pages to his *Revue*. Doctor Broca, in fact, was later on the first person to provide me his support when the question arose about bestowing on my work the prize that the Anthropology Society awards every two years to the best work published on anthropology. All independent scholars are aware how rare similar acts are. Indeed, I am forever indebted to this departed illustrious master for the many kindnesses he extended me.

My treatise has served as a point of departure for a most remarkable work by Professor Morselli, titled: *Critica e riforma del metado antropologio fondate sulla legi statistiche e biologische dei Valori Seriali e sull' experimento* (Rome, 1880, published by the Statistics Board of the Italian Ministry of Agriculture and Commerce). Professor Morselli, who is one of the first to have made use of the placing in series method, applies in his book to several cranial characteristics this method that I only applied to a single such characteristic. It would be desirable that this excellent work, quite superior to average anthropological

productions, be translated into French. The only criticism that I shall make to the author of this volume is that he combined numbers obtained by observers of different countries. Lacking a general agreement pertaining to the adoption of fixed guide marks or uniform methods of measurement, foreign anthropologists operate a little according to each's fancy, with the result being that the numbers derived by every one of them are not at all comparable. I verified many times this fact during the 1878 Anthropology Exposition where skulls originating from foreign museums appeared, along with catalogs indicating these skulls' measurements. The cubages that I effectuated on skulls from the Helsingfors Museum, for example, often revealed differences of 125 cubic centimeters with the numbers provided by the catalog. When I began my work, I also intended to combine measurements made by anthropologists of different countries, but I soon recognized that this would prove impossible and that, under penalty of obtaining erroneous results, it was necessary to only compare my measurements with those of the same observer. In order to give a typical example, I shall relate the following case that is reported in my treatise. In submitting to calculation the numbers provided by Schaaffhausen (in his work: *Die anthropologische Sammlung des anatomischen Museum der Universitat*, Bonn, 1877) for the capacities of 153 German skulls, I discovered that they lead to the following result which is in contradiction with all that we know in anthropology: that Germans possess a much less voluminous skull than negroes. Now, in my own research I have made many similar observations and calculations, but exclusively on skulls belonging to the collection of the Paris Anthropology Museum. I have thus necessarily reduced my sources of information, but for me the quality of information is much more important than the quantity. Moreover, the value in multiplying beyond a certain number of elements upon which one operates is not as great as one might at first think. In fact, mathematical probabilities show that the precision of derived results do not at all increase in proportion to the number of observations, but rather only in proportion to the square root of this number. It therefore is necessary, in order to obtain results that are two, three, or four times more precise, for one to make respectively four, nine, or sixteen times more numerous observations; however, with the limited number of material presently existing in museums, such an undertaking will simply not be possible.

"The Method of Averages in Anthropology"

by Doctor Gustave Le Bon

Revue Scientifique
January 14, 1882

Robert K. Stevenson: Translator and Editor

[Editor's note: In the preceding work, "The Study of Races and Present-day Anthropology," Doctor Le Bon strongly criticizes anthropologists of his era for: 1) focusing too much on taking craniological measurements, and 2) utilizing only one statistical method—the taking of averages—in analyzing their obtained data. Not surprisingly, this criticism drew an immediate negative reaction from many craniologists. In the paper presented here Doctor Le Bon masterfully rebuts a critique of his above-mentioned work made by Doctor Léonce Manouvrier, who was a young lab assistant at the time, and once again espouses the value to science of the employment of the centesimal curves method.]

My recent work on the present state of anthropology in France seems to have greatly affected the craniologists, and after three weeks the echoes from their laboratory are retained a little loudly in the counsels given by the young lab assistant charged with being the mouthpiece for the defenders of the attached edifice.

The lab assistant's given response mainly restricts itself to a claim of priority, that is, the young author was reduced, in order to refute me, to attribute to me opinions totally opposite to those that I have asserted here previously. By styling me as the "so-called inventor of the seriation method," he must be supposing that the readers of

this journal possess a very bad memory. This is because I clearly stated not along ago in the December 17, 1881 issue on page 776 (2nd column) that this method is *as old as mankind*, and I added that "Quételet in France, Morselli in Italy and some statisticians make rare applications of it to anthropology and statistics." I then pointed out why it is not in general use and also why it will not be able to become generalized. In fact, this method is so little widespread that it will only very exceptionally appear in the works of anthropologists. For example, in the innumerable tables that are contained in the sole anthropology manual published in France (1876), one will only see the method of averages represented. Indeed, the seriation method is used so rarely that the learned Italian anthropologist Morselli has recently written a volume whose publication, he says, was inspired by the appearance of my Paper and whose purpose is to demonstrate the utility of this method.

The seriation method is therefore known, but it is hardly ever employed, and this by reason of the difficulty of handling the numerous totals through which it expresses itself, and also because it is not able to easily render comparable graphic methods presently in use. The particular system of curves, called ***centesimals***, that I have invented immediately places in evidence the mathematical relations existing between comparative dimensions, after which the method of setting up a series can be readily employed. Now, I must point out that not only professional anthropologists, but also distinguished mathematicians such as Professor Delbœuf, who is well-known to the readers of this *Revue*, have appreciated the novelty and importance of these curves. In short, I have never pretended to have invented a method so old that it is difficult to name its inventor, but the system of curves that I have described is completely new and independent.

The assertion that my Paper would have seemed to be "a simple dissertation" to our late esteemed colleague, Doctor Broca, is just as inaccurate as the preceding claim regarding priority. I worked a long enough time with Doctor Broca to know what he would have thought. It should suffice for me to remind the readers that Doctor Broca was the first to provide his voice for awarding my Paper the proposed prize for the best work published on anthropology. The

young writer cannot be ignorant of the fact that this prize is not given out to simple dissertations.

Another assertion that "when Broca learned what my claim was, he did not fail to reestablish the facts" has exactly the same value as those already enunciated. The disturbance instigated by my work on the employment of averages in anthropology preoccupied Doctor Broca, and he published to this purpose a long paper on the method of averages; but never did he ever accuse me of borrowing from him with respect to the Paper that I had published in his own journal. He rightly declared of having employed in rare cases the seriation method, acknowledging it to be useful, but reached nevertheless the following conclusion, which resulted moreover from all his earlier works: "In brief, I think that it is sufficient in most cases to provide a table of the averages along with the maximum and minimum differences."

Our young contradictor further asserts that it is not difficult "to adorn this process (the seriation method) by reproducing graphically numbers already known." When our critic comes to possess a little more experience, he will surely recognize that it is much more difficult to discover a method permitting one to see in "known" numbers what others have not seen and who invariably end up instead pondering hundreds of arms and legs and the like. The centesimal curves method is certainly very simple, but it has permitted me to discern in known numbers the mathematical relations which I have provided a summary of in my preceding article, relations which have heretofore escaped the detection of extremely skilled anthropologists. The results that I have obtained are today generally conceded as valid by all competent anthropologists and have been entered in the standard anatomy books. Additionally, my formulas are presently used in laboratories: the one, for example, that I have given to determine the volume of the skull in terms of its diameters has been employed many times by anthropologists as distinguished as Professors Mantegazza and Regalia in their recent publications.

As for the so-called "reproach" that Professor Morselli will supposedly make to me, it will suffice in order to appreciate the value of the "reproach" qualitative, to reproduce some of the passages where

this scholar speaks of my Paper; in fact, they are so highly favorable I may decide to translate them.[1] In the meantime, Professor Morselli has claimed, and rightly so, I believe, on behalf of Italian anthropologists and himself, of having been the first to make use of the seriation method in anthropology; but, much more than Doctor Broca, Doctor Bertillon, and myself, he has not for a single instant entertained the idea of believing himself to be the inventor of a method which, I repeat, is extremely old. Quételet, who had already applied it for a very long time to anthropology, certainly had not pretended as well to being the inventor.

When Doctor Broca defended the method of averages, he declared that for him the process of seriation plays a part. He undoubtedly had the right to include in the averages whatever he judged useful to put in; but his young disciple spreads confusion when he states his belief that in science it is admitted that "the method called the averages contains not only the process of arithmetic averages, but also the processes of ordination and seriation." The most elementary books readily provide information on this point, and sufficient explanations will be found in the work on averages by our eminent colleague, Doctor Bertillon. "In science the average is a value which is obtained by adding numbers and values possessing the same nature, but whose sizes are more or less different among them, and then dividing the sum by the number of the individual amounts... An average is an abstract value created so as to form an intermediate and *unique* result of a large number of already known sizes."

Between the method of averages, which results in a *unique* amount, and the seriation method, which yields several amounts and is the negation of the preceding, there is no reconciliation possible.

Doctor Manouvrier has rightly said that Doctor Broca's memory is cherished by all anthropologists. I am not aware of anyone who cherishes it more than me, and readers of my previous article know with what respect I have spoken of this eminent master. The criticisms that I have directed at the old and pernicious method of averages are ones I have made even when Doctor Broca was alive and in his own journal. I therefore do not have any scruples to repeat

them after his death. Doctor Broca was one of those great and independent spirits who was unafraid of criticism, and he was not one to close his laboratory to a scientist who did not share all his opinions.

Finally, I have found it somewhat amusing the pretension of wishing to defend the memory of the illustrious professor against my supposed attacks; and it's certainly not necessary for me to go to the trouble of restoring or enhancing it given that Broca's long-time lab assistant, who became Secretary-General of the Anthropology Society and brought my article to the attention of the Society, has also asserted that I have not "harshly treated Broca and the Anthropology Society." As far as Doctor Broca is concerned, what I have previously stated is a more than sufficient response. With respect to the Anthropology Society, I have intended to harshly treat only the agitated craniologists who today dispute the crumbs of the master and who will end up letting fall into the dust work that they feel incapable of continuing. The many congratulations that I have received for my article from the most influential members of the Anthropology Society have proven to me that the ideas that I have expounded on the present state of anthropology are generally shared. The most distinguished professors at the School of Anthropology have expressly requested that I write that they are in accord with me respecting the solid basis of my work. I therefore have the hope that the reform, whose urgency I have pointed out and whose contours to effect it I have outlined, will be undertaken, and that it will be in the Anthropology Society itself where capable scientists will be found to firmly take the initiative.

FOOTNOTE

1. Here is one of these passages: "Premetto che il mio reclamo di priorità (se puo esservi priorità in un'applicazione di metodi scientifici, che doveva presto o tardi aver luogo), non diminuisce l'importanza e la originalità del bel lavoro del Le Bon, che è veramento ammirabile per la novità dei concetti, per l'applicazione delle figurazioni graffiche alla craniologia, per i resultati ottenuti, ed era ben degno degli elogi unanimi e delle onorificenze che procurò al suo autore. Dirò anzi che leggendolo si sente crescere ad ogni pagina la stima verso un osservatore si diligente ed originale, che accenna con questo scritto a volere occupare uno dei primi posti nella nobile gerarchia della scienza." (*Critica e riforma*, etc., p. 1.)